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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,504	04/19/2004	Yury Logvin	123-31 US	1945

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EXAMINER

DUPUIS, DEREK L

ART UNIT	PAPER NUMBER
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2883

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/826,504

Applicant(s)

LOGVIN ET AL.

Examiner

Derek L. Dupuis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 9, 11 and 14-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10, 12, 13 and 18-20 is/are rejected.
- 7) ☒ Claim(s) 20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/19/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-13 and 18-20, drawn to a waveguide structure, classified in class 385, subclass 129.
 - II. Claims 14-17, drawn to a method of using a waveguide structure, classified in class 385, subclass 32.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case the process can be practiced using a materially different product such a lossy waveguide with lossy and cladded regions.
3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.
4. Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

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5. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. Invention I contains claims directed to the following patentably distinct species:

Species A: Claims 1-8, 9, 11-13 and 18-20 are drawn to a waveguide structure shown in figure 5.

Species B: Claims 1-8, 10, 12, 13, and 18-20 are drawn to a waveguide structure shown in figures 6 and 7.

7. The species are independent or distinct because Species A includes a single curved waveguide while Species B includes an S-shaped waveguide.

Should applicant elect Invention I, applicant is also required under 35 U.S.C. 121 to further elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 1-8, 12, 13, and 18-20 are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

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8. During a telephone conversation with Gordon Freedman (Reg. No. 41,553) on 3/2/2006 a provisional election was made without traverse to prosecute the Invention I, Species B shown in figures 6 and 7, claims 1-8, 10, 12, 13, and 18-20. Affirmation of this election must be made by applicant in replying to this Office action. Claims 9, 11, and 14-17 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

9. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

10. The information disclosure statement (IDS) submitted on 4/19/2004 has been considered by the examiner.

Drawings

11. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the second waveguide described in claims 4, 5, 19, and 20 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing

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should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

12. The disclosure is objected to because of the following informalities: in line 5 of paragraph 3, the phrase “relies of on” should apparently be “relies on”. In lines 7 of paragraph 3, the phrase “same to chip” should apparently be “same chip”. In line 10 of paragraph 3, the phrase “area of substrate” should apparently be “area of the substrate”.

Appropriate correction is required.

Claim Objections

13. Claim 20 is objected to because of the following informalities: The words “second waveguide” in line 2 of the claim should apparently be “trench”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

15. Claims 1-5, 8, 10, 12, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by

Kimerling et al (US 2002/0076188 A1).

16. Kimerling et al teach a waveguide structure as shown in figure 1 comprising a curved waveguide portion (102) that is curved having local radii of curvature and a first trench (104) disposed on an inside of the curvature of the waveguide. The first trench is filled with air and therefore has a low index of refraction. The trench comprises a first portion (1) disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein, a second trench portion (3) disposed sufficiently proximate the waveguide to substantially enhance confinement of an optical signal propagating within the curved waveguide portion, and a third trench portion disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein. The curved waveguide comprises a first waveguide portion (1) which is straight, a second waveguide portion (2) which is curved having local radii of curvature and optically coupled between the first and third waveguide portions; and a third waveguide portion which is straight.

17. A second trench (106) is disposed on a second side of the waveguide. The second trench is also filled with air and therefore has a low index of refraction. The second trench comprises a first portion (1) disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein, a second trench portion (3) disposed sufficiently proximate the waveguide to substantially enhance confinement of an optical signal propagating

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within the curved waveguide portion, and a third trench portion disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein.

18. As shown in figure 5A, the waveguide structure includes a semiconductor substrate. The waveguide is a buried waveguide as can be seen in figures 2, 5, and 6. As can be seen in figure 2, at least one trench portion does not perforate the surface of the structure.

19. In figure 4, Kimerling et al teach first (404) and second (406) optical waveguide portions. A first trench (410) is located on the inside curvature of the first waveguide portion (404). A second trench (414) is located on the outside of the curvature of the first waveguide portion (404). The second waveguide (406) is disposed on a side of the second trench (414) that is opposite the first waveguide (404) as can be seen in figure 4. The second waveguide portion is sufficiently close to the second trench to enhance confinement of an optical signal propagating within the second waveguide (406).

20. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

21. Claims 1 and 6 are rejected under 35 U.S.C. 102(a) as being anticipated by *Popovic et al* (“*Air Trenches for Sharp Silica Waveguide Bends*”).

22. Popovic et al teach a waveguide structure as shown in figure 1 comprising a curved waveguide portion that is curved having local radii of curvature and a first trench disposed on an inside of the curvature of the waveguide. The first trench is filled with air and therefore has a low index of refraction. The trench comprises a first portion (I) disposed sufficiently distant the

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waveguide to prevent a change in mode profile of an optical signal propagating therein, a second trench portion (III) disposed sufficiently proximate the waveguide to substantially enhance confinement of an optical signal propagating within the curved waveguide portion, and a third trench portion disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein. As can be seen specifically in figure 1b and in Table III, the curve has a varying radius of curvature. As can be seen in figure 1b, the radius of curvature would have a continuous first derivative.

Claim Rejections - 35 USC § 103

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kimerling et al (US 2002/0076188 A1)*.

25. Kimerling et al teach a waveguide structure as shown in figure 1 comprising a curved waveguide portion (102) that is curved having local radii of curvature and a first trench (104) disposed on an inside of the curvature of the waveguide. The first trench is filled with air and therefore has a low index of refraction. The trench comprises a first portion (1) disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein, a second trench portion (3) disposed sufficiently proximate the waveguide to substantially enhance confinement of an optical signal propagating within the curved

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waveguide portion, and a third trench portion disposed sufficiently distant the waveguide to prevent a change in mode profile of an optical signal propagating therein.

26. In figure 4, Kimerling et al teach first (404) and second (406) optical waveguide portions. A first trench (410) is located on the inside curvature of the first waveguide portion (404). A second trench (414) is located on the outside of the curvature of the first waveguide portion (404). The second waveguide (406) is disposed on a side of the second trench (414) that is opposite the first waveguide (404) as can be seen in figure 4. The second waveguide portion is sufficiently close to the second trench to enhance confinement of an optical signal propagating within the second waveguide (406).

27. Kimerling et al teach that the waveguide structure design can be used in combination with a computer storage medium, namely, a simulator (see paragraph 20). It is routine in the art to use computer programming to provide a computer program to design waveguides.

28. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Popovic et al ("Air Trenches for Sharp Silica Waveguide Bends")* as applied to claims 1 and 6 above, and further in view of *Fischer et al (US 4,810,049)*.

29. Popovic et al teach a waveguide structure as discussed above in reference to claims 1 and 6. Popovic et al do not explicitly state that the waveguide structure with trenches could be applied to a waveguide with a radius of curvature that has a continuous second derivative. Fischer et al teach a S-shaped waveguide as shown in figure 1. It would have been obvious to apply the dual trench design of Popovic et al to the S-shaped waveguide of Fischer et al. Motivation to do this is the suggestion by Fischer et al to effect the mode propagation of the

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waveguide by using air trenches as seen in figure 1. The dual trench design of Popovic et al has improved substrate loss and is useful for compact waveguides (see abstract).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek L. Dupuis whose telephone number is (571) 272-3101.

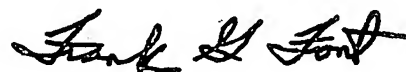
The examiner can normally be reached on Monday - Friday 8:30am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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